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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/874,606	06/05/2001	Stephen L. Skala	PHA 51243A	6706

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EXAMINER
IM, JUNGHWA M

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 06/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/874,606	Applicant(s) SKALA ET AL.
	Examiner Junghwa M. Im	Art Unit 2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 4, 9, 12 are objected to because of the following informalities:

The thickness of the diffusion barrier, 1.0 micron is within the range of the limitation over the thickness in claim 3.

Claim12 is a duplication of claim 9 and both claims depend on claim 8.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim1, 2, 5, 6, 7, 8,10, 11, 14 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. to 5,693,565 to Camilletti et al.

Regarding claim 1, Camilletti et al. teach, in Fig. 4, a semiconductor chip having circuitry, the semiconductor chip comprising:

a metal bond pad layer (11A) over the circuitry and insulated on at least two sides by passivation material (12A);

a diffusion barrier layer (15A) over the metal bond pad; and

a metal layer over (16A) the circuitry, the metal bond pad, the diffusion barrier layer and at least partially over the passivation material, the metal layer being configured and arranged for connecting to a wire bond and the diffusion barrier layer being constructed and arranged to mitigated inter-metallic compounds forming as a reaction to the metal layer connecting to the wire bond (col. 8, lines 4-6 and col.8, lines 47-49).

Regarding claim 2, Camilletti et al. teach that the diffusion barrier layer includes TiN (col. 8, line 41).

Regarding claim 5, Camilletti et al. teach that a semiconductor chip is configured and arranged as a flip chip (col. 3, line 42).

Regarding claim 6, Camilletti et al. teach that the metal bond pad includes aluminum (col. 3, line 38).

Regarding claim 7, Camilletti et al. teach that the diffusion barrier layer includes TiN (col. 8, line 41).

Regarding claim 8, Camilletti et al. teach that the diffusion barrier layer is constructed and arranged to mitigate inter-metallic Al/Au compounds forming as a reaction to the metal layer connecting to the wire bond (col. 8, line 32-50).

Regarding claim 10, Camilletti et al. teach that the metal bond pad and metal layer include the same type of metal (col. 8, line 8-14).

Regarding claim 11, Camilletti et al. teach, in Fig. 4,a semiconductor chip having circuitry, the semiconductor chip comprising:

an aluminum bond pad (11A) layer over the circuitry and insulated on at least two sides by passivation material (12A);

a diffusion barrier layer (15A), including TiN (col. 8, line 41) , over the aluminum bond pad; and

a metal layer (16A) over the circuitry, the metal bond pad, the diffusion barrier layer, and at least partially over the passivation material, the metal layer being configured and arranged for connecting to a wire bond and the diffusion barrier layer being constructed and arranged to mitigated inter-metallic aluminum-based compounds forming as a reaction to the metal layer connecting to the wire bond (col. 8, lines 4-6 and col.8, lines 47-49).

Regarding claim 14, Camilletti et al. teach, in Fig.4, a semiconductor chip having circuitry, the semiconductor chip comprising:

an aluminum bond pad (11A) layer over the circuitry and insulated on at least two sides by means for electrically insulating the aluminum bond pad;

barrier means (15A), including TiN, over the aluminum bond pad; and

a metal layer (16A) over the circuitry, the metal bond pad, the barrier means, and at least partially over means for electrically insulating the aluminum bond pad, the metal layer being configured and arranged for connecting to a wire bond and the diffusion barrier layer being constructed and arranged to mitigated inter-metallic aluminum-based compounds forming as a reaction to the metal layer connecting to the wire bond (col. 8, lines 4-6, and col.8, lines 47-49).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 3, 4, 9,12,13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. to 5,693,565 to Camilletti et al. in view of U.S. Pat. No. to 6,082,610 to Shangguan et al.

Regarding claim 3, Camilletti et al. disclose all the limitations as recited in claim 1, except the specified thickness of the diffusion barrier layer.

Shangguan et al. disclose, in Fig. 1, an aluminum bonding pad (12) with a diffusion barrier layer (14) which has a thickness at least 0.5 micron (col. 3, line 39).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teaching of Shangguan et al. into the device taught by Camilletti et al. since such thickness of the diffusion barrier layer will improve the stability of the device and alleviate the interaction between the metal layers.

Regarding claim 4, also in compliance with 35 U.S.C. 112, the minimum thickness of 1.0 microns for the diffusion barrier layer is within the rage of the thickness recited in claim 3.

Regarding claim 9, Camilletti et al. disclose all the limitations as recited in claim 1, except the specific thickness of the diffusion barrier layer and the metal layer.

Shangguan et al. show, in Fig. 1, that a flip chip having an aluminum bonding pad (12) which have a diffusion barrier layer (14) with a thickness at least 0.5 micron (col. 3, line 39) and a metal layer (16) with the thickness of 3 microns at least (col. 3, line 53).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teaching of Shangguan et al. into the device taught by Camilletti et al. since such thickness of the diffusion barrier layer and the metal layer will improve the stability of the device and alleviate the interaction between the metal layers.

Regarding claim 13, Camilletti et al. disclose the diffusion barrier layer is constructed and arranged to mitigate inter-metallic Al/Au compounds forming as a reaction to the metal layer connecting to the wire bond (col. 8, line 32-50).

Note that claim 12 is, also in compliance with 35 U.S.C. 112, is the duplication of claim 9.

It is suggested to make appropriate correction.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (703) 305-3998. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers

for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JMI
June 3, 2002

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800